Evaluatin of Body Weight And Some Morphometric Traits Of Laboratory Albino Rat (*Rattus norvegicus*)

Shehu, M. A., *Agere, H. I.J., Shehu, D. M., Elijah, B. B.

Abstract— This study was aimed at studying the body weight (BW) and some morphometric traits at birth, 7, 14, 21, 28 and 35 days of laboratory albino rats, *Rattus norvegicus*. Sex effect and the various phenotypic correlations between the traits were evaluated. Traits studied were Body Weight (BW), Head Length (HL), Tail Length (TL), Body Length (BL) and Heart Girth (HG). The coefficient of variation for traits studied were generally moderate to high at lower ages but relatively low at 35 days. The coefficient of variation for traits studied was high for body weight at 7, 14, and 21 days and moderate for head length and tail length at various ages, but relatively low for heart girth. Traits significantly ($p < 0.05$) affected by sex were body weight, tail length, body length and heart girth at birth, and head length at 28 days. Phenotypic correlation between BW and all the other traits studied were highly significant ($p < 0.001$), correlation being higher in younger groups than in older groups. Correlation between HL and HG, BL and HG and also between BW and TL at 7, 21 and 35 days respectively were significant $p < 0.01$, while the phenotypic correlation of heart girth (HG) with tail length (TL) and body length (BL) at 21 and 28 days respectively, and also between body weight (BW) and tail length (TL) at 35 days were significant at $p < 0.05$. This study reveals that morphometric traits can be used as aids to selection in laboratory albino rat's genetic improvement and also live body weight prediction.

Index Terms— Morphometric, Body-weight, Albino, Rat, Phenoytpe, Trait, Prediction.

1 INTRODUCTION

The Laboratory albino rat belong to the Phylum Chordata, Family Rodentia, and Genus *Rattus*. The rat, *Rattus novergicus*, was bred purposely for scientific research(Baker,et.al,1980). The rat pup, at birth, weighs about 5*g* and is blind, but very active, growing rapidly to 35-50*g* by three weeks. The adult male weighs from 400-500*g* with the female weighing about 100*g* or less (Orheruata, 1991). Size/weight varies markedly between strains. Selection for growth is usually done on the basis of body weight. The decision to use an indirect measurement for selection purposes for growth will depend on the ease of taking the measurements and how these measurements can predict body weight. One of such substitutes is the use of linear measurements (Orheruata, 1991).

According to Hassan,et.al(2012),linear body measurements could be a means of describing the size and shape of farm animals. Ibe and Ezekwe (1994) reported that linear body measurements have been used to characterize breeds, evaluate breed performance and predict live body weight of animal. It is against this background that the study was undertaken with the aim of determining the degree of association between body weight and linear body measurements. An attempt also was made to find out the effect of sex on the interrelationship between body weight and linear body measurements.

2 MATERIALS AND METHODS

2.1 Study Location

The study was conducted in the Biology Laboratory, Department of Biological Sciences, Ahmadu Bello University, Zaria, Kaduna State, Nigeria.

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2.2 Housing and Feeding

Aluminum cages with wire cover and saw dust on the floor were used in the collecting and managing of the rats. The rats were shared into two separate cages each containing one (1) male and five (5) females, since their mating harem is 1 male to 5 or 6 females. After birth, a female rat was separated from the main cage to a separate cage with her pups (newly borne rats).

Rats were kept at room temperature (at 24±2°C) and relative humidity of 55±10%. Rats were fed with maize offal mixed with commercial pelleted vital feed in the ratio 2: 1 (i.e. 288*g* of the maize chaff and 144g of the vital feed) and tap water was used to mold the feed to form a bolus to avoid wastage during feeding. Water was provided by bottle with a narrow tube, intake was by sipping.

2.3 Experimental design

Data were recorded on morphometric characters and body weight of 57 animals, of which 30 were males and 27 females, from birth to 35 days of age. Body weight and linear body

measurements on the animals were recorded, at birth, then at 7, 14, 21, 28, and 35 days of age. All body weight was taken by using digital electronic weighing balance in grams. The morphometric characters were measured in centimeters using measuring board. These characters include, Head length (HL), Tail length (TL), Body length (BL), Heart girth (HG).

2.4 Sexing: Sex was determined using the anogenital distance. Males have a greater anogenital distance than females as well as a larger genital papilla. In addition, different colors of indelible markers were used to mark the animals (each with separate mark) from birth to 35 days.

3 RESULTS AND DISCUSSION

Data were recorded on morphometric characters and body weight of 57 animals. Of these, 30 were males and 27 females. Body weight and linear body measurements on the animals were recorded, at birth, then at 7, 14, 21, 28, and 35 days of age. Two (2) of the animals died before weaning and were both males while tree (3) of the animals died after weaning, two of which were females and 1 male. An overview of the number and distribution of the rats across the sex and ages is shown in table I.

Table 1: Distribution of Experimental Animals

Age groups	Males	Females	Total
At birth	30	27	57
At 7 days	28	27	55
At 14 days	28	27	55
At 21 days	28	27	55
At 28 days	27	25	52
At 35 days	27	25	52

Table 2: Least Squares Means And Coefficient Of Variation Of Linear Measurement At Birth, 7, 14, 21, 28 And 35 Days

\	AT BIRTH		AT 7 DAYS		14 DAYS	
Traits	**Mean± S.E**	**C . V**	**Mean ± S.E**	**C . V**	**Mean ± S.E**	**C . V**
BWT (g)	5.225±0.096	12.434	10.027±0.366	24.815	18.096±0.802	30.819
HL (cm)	1.561±0.021	9.562	2.306±0.039	11.704	2.950±0.032	7.591
TL (cm)	1.480±0.025	11.862	3.046±0.063	14.791	4.858±0.079	9.916
BL (cm)	5.788±0.060	7.150	9.315±0.145	10.854	12.423±0.199	10.583
HG (cm)	2.788±0.029	7.080	3.917±0.075	12.291	4.573±0.089	14.179

BWT = body weight, **HL =** head length, **TL** = tail length, **BL** = body length, **HG** = heart girth, **S.E =** Standard Error, **C.V =** Coefficient of Variation

A G E	21 DAYS		28 DAYS		35 DAYS	
Traits	Mean ± S.E	C . V	Mean ± S.E	C . V	Mean ± S.E	C . V
BWT (g)	**28.159±1.149**	**29.579**	**42.665±1.432**	**23.943**	**57.383±1.459**	**18.465**
HL (cm)	**3.535±0.050**	**10.208**	**3.882±0.048**	**8.160**	**4.206±0.052**	**8.908**
TL (cm)	**6.904±0.129**	**12.636**	**10.312±0.202**	**13.706**	**12.867±0.182**	**9.661**
BL (cm)	**15.650±0.305**	**13.274**	**6.692±0.114**	**10.968**	**24.225±0.217**	**6.223**
HG (cm)	**5.702±0.090**	**10.739**	**21.267±0.321**	**8.899**	**7.621±0.088**	**8.146**

BWT = body weight, **HL =** head length, **TL** = tail length, **BL** = body length, **HG** = heart girth, **S.E =** Standard Error, **C.V =** Coefficient of Variation

Traits that were significantly affected (at $p > 0.05$) by sex were; body weight, tail length, and body length and heart girth all at birth and head length at 28 days (with males being higher in all the characters).This is also in agreement with the

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HG (cm)	2.788±0.029	7.08	3.917±0.075	12.291	4.573±0.089	14.179

results of Jacint and Maria, (2000) in black rat, *Rattus rattus.* Although males were slightly larger than the females in all

AGE	21 DAYS		28 DAYS		35 DAYS	
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the traits on the average, there was no significant sexual dimorphism in the various ages studied. This is in agreement with the general trends shown by Western Mediterranean black rat population (Garanjon and Cheylan, 1990, Zamorano 1985)

Table 4 shows the correlation coefficient for traits at birth (above diagonal) and at 7 days (below diagonal).

Table 5 shows the correlation coefficient for traits at 14 days (above diagonal) and 21 days (below diagonal).

Table 6 also shows the correlation coefficient of body weight and linear body measurements at 28 days (above diagonal) and 35 days (below diagonal).

Body Measurement

Table 3: Shows the Sex Effect on Body Weight and Linear

BWT = body weight, **HL =** head length, **TL** = tail length, **BL** = body length, **HG** = heart girth, **S.E =** Standard Error, **C.V =** Coefficient of Variation

BWT = body weight, **HL =** head length, **TL** = tail length, **BL** = body length, **HG** = heart girth, **S.E =** Standard Error, **C.V =** Coefficient of Variation

In general, the phenotypic correlation between body weight and all other traits at various ages were highly significant at $p < 0.001$ with very little moderate correlation at $p < 0.01$ and a single negative correlation between head length and heart girth at 7 days.

The phenotypic correlation between body weight and all the other the traits at various ages of studies were significantly high at $p < 0.001$ with very few moderate correlation at $p < 0.01$ and at $p < 0.05$.

These changes might be as a result of nutritional status of the individuals, competition between individuals of a cage, litter size, physiological states of the individual as well as ecological factors.

CONCLUSION

Morphometric traits, as they were highly correlated with body weight in laboratory rat, *Rattus norvegicus,* can be effective in body weight prediction and genetic selection will be effective in improving morphometric traits.

Sex was found to have significant effect on body weight, tail length, and body length and heart girth at birth and head length at 28 days.

Phenotypic correlation of body weight with the other traits at various ages of study was found to be very significant at $p < 0.001$ level.

The investigation therefore,shows that morphometric traits can be used as aids to selection in laboratory albino rat's genetic improvement and also live body weight prediction.

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